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Pillsbury Winthrop LLP
Intellectual Property Group
Suite 2800
725 So. Figueroa Street
Los Angeles, CA   90017-5406

EXAMINER
WANG, JIN CHENG

ART UNIT	PAPER NUMBER
2672	

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/822,923	FRAZER ET AL.
	Examiner	Art Unit
	Jin-Cheng Wang	2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>09/03/2003</u> .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-11,13-18 and 21-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-11,13-18 and 21-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4)☐ Interview Summary (PTO-413) Paper No(s). _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: .

DETAILED ACTION

Response to Amendment

The amendments filed on 09/03/2003 have been entered. Claims 1, 4-9, 11, 14-17, and 21-28

have been amended. Claims 2, 12, 19-20 have been canceled.

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

1.   Claims 1, 3-11, 13-18, 21-28 are rejected under 35 U.S.C. 102(e) as being anticipated by

Bradski et al. U.S. Pat. No. 6,363,160 (hereinafter Bradski) in view of Zabih et al. U.S. Patent

No. 6,181,817 (hereinafter Zabih), Kenet et al. U.S. Patent No. 5,016,173 (hereinafter Kenet) and

Darrell et al. U.S. Patent No. 6,188,777 (hereinafter Darrell).

2.   Claim 1:

(1) Bradski teaches an automated calibration system (figure 1; column 3, lines 34-55) to

track a selected object through a series of frames of data (column 7, lines 55-65), comprising:

A display device (e.g., figure 11) to display at least one image frame received from an

image input device, wherein the image frame includes a calibration rectangle (column 4, lines 2-

60; column 15, lines 13-58; figures 4, 10A and 10B);

An image selection device to select, via the calibration rectangle, the selected object in the at least one image frame (column 3, lines 59-67, column 4, lines 1-10, and column 7, lines 33-54; column 15, lines 13-58);

An image source device (video source 1102 of figure 11) to provide a hue saturation value (HSV) data array of pixels forming the at least one image frame (column 4, lines 2-57; column 13, lines 45-52; column 15, lines 13-58; figures 3A and 3B); and

A processing device (figures 1-9; column 13, lines 55-67; column 14, lines 1-59) to determine analysis data for pixels (column 4, lines 2-57; figures 4, 3A and 3B) within the calibration rectangle (column 5, lines 52-67; column 6, lines 1-44; column 15, lines 13-58; figures 4, 10A and 10B), based on the HSV data array (column 4, lines 2-57; figures 3A and 3B), and determine test analysis data (e.g., window sizing parameters) for a set of adjacent test windows (e.g., search windows or boxes or windows of FIG. 14A displaying images; column 5, lines 52-67; column 6, lines 1-44; column 15, lines 13-58), each of the adjacent test windows (e.g., the moving search windows) having a same shape as the calibration rectangle (e.g., the entire video frame or a calculation region in a form of rectangle or a search window; column 7, lines 5-55; column 15, lines 13-58), wherein tracking data, to track the selected object (e.g., the selected gestures), is selected from one of the calibration rectangle (e.g., the calculation region in a form of rectangle) and the adjacent test windows (e.g., the search windows) having a highest tracking probability (i.e., the tracking data such as window location parameters are determined/adjusted and a search window having the largest connected region of a probability distribution and the greatest probability density is selected, column 6, lines 45-67; column 7, lines 55-67; column 8, lines 1-9; column 15, lines 13-58) and each of the adjacent test windows

share at least one pixel with the calibration rectangle (e.g., column 7, lines 5-55; column 15, lines 13-58).

(2) However, Bradski is silent on the claim limitation of "lowest sum of a hue standard deviation and a saturation standard deviation".

(3) Darrell in view of Zabih and Kenet teaches selecting an object based on the "lowest sum of a hue standard deviation and a saturation standard deviation." (e.g., Darrell column 10, lines 44-65; Zabih column 2, lines 20-37; Kenet column 20, lines 10-30; Kenet column 16, lines 1-20). Darrell teaches selecting a tracking object based on the optimum ranges and the highest probability density of a search region by collecting the variance data of joint probability distributions for the observed color data while Zabih teaches selecting a best match result (with the optimum ranges and the highest probability density) for an object based on the color joint histograms of the candidate images and based on the calculation of the standard deviations (variance) for each color in HSV color space while Kenet teaches finding a search region based on the optimum ranges/criteria by optimization and joint histograms.

(4) It would have been obvious to one of ordinary skill in the art to have incorporated the Darell/Zabih/Kenet's selection means with the optimum ranges/criteria into the Bradski's invention to select a tracking object based on the lowest sum of a hue standard deviation and a saturation standard deviation. Bradski teaches performing pattern recognition based on Gaussian and Chi-square distributions to determine a best match for the tracked object and therefore suggests selecting a tracking object based on the lowest sum of a hue standard deviation and a saturation standard deviation because such a selection of optimum ranges yields the best match tracking object.

(5) One having the ordinary skill in the art would have been motivated to do this because

it would have provided a routine experimentation of the optimum ranges and criteria for object

selection to find the best match tracking object.

Claim 3:

The claim 3 encompasses the same scope of invention as that of claim 1 except additional

claimed limitation of a digital camera. However, Bradski further discloses the claimed limitation

of the digital camera (Bradski column 4, lines 1-57).

Claim 4:

The claim 4 encompasses the same scope of invention as that of claim 1 except additional

claimed limitation of a single device. However, Bradski further discloses the claimed limitation

of the single device (figure 1).

Claim 5:

The claim 5 encompasses the same scope of invention as that of claim 1 except additional

claimed limitation of the processing device calculating a mean hue and a standard deviation of a

hue of the pixels representing the selected object. However, Bradski further discloses the claimed

limitation of the processing device (figures 1- 9) calculating a mean hue and a standard deviation

of a hue of the pixels representing the selected object (figures 3A, 3B and 4; column 4, lines 2-

57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 12, lines 1-

67).

Claim 6:

The claim 6 encompasses the same scope of invention as that of claim 5 except additional claimed limitation of the selected object not being tracked if the mean hue or the standard deviation of the hue is less than predetermined levels. However, Bradski further discloses the claimed limitation of the selected object not being tracked if the mean hue or the standard deviation of the hue is less than predetermined levels (It is apparent that a Gaussian or Chi-Square hue probability distribution of Bradski involves the mean hue or the standard deviation of the hue and search for the area with the greatest probability density involves the motion-tracking processing of not tracking a region where the mean hue or the standard deviation of the hue being less than predetermined levels; figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 1-63, and column 6, lines 22-44; column 8, lines 10-38; column 12, lines 1-67).

Claim 7:

The claim 7 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of the analysis module calculating a mean saturation and a standard deviation of a saturation of the pixels representing the selected object. However, Bradski further discloses the claimed limitation of the processing device (e.g., figures 1-9) calculating a mean saturation and a standard deviation of a saturation of the pixels (e.g., a mean saturation and a standard deviation of a saturation of the pixels is an inherent property of a Gaussian or Chi-Square probability density) representing the selected object (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 8, lines 10-38; column 12, lines 1-67).

Claim 8:

The claim 8 encompasses the same scope of invention as that of claim 7 except additional

claimed limitation of the colored object not being tracked if the mean saturation or the standard

deviation of the saturation is less than predetermined level. However, Bradski further discloses

the claimed limitation of the selected object not being tracked if the mean saturation or the

standard deviation of the saturation is less than predetermined level (figures 3A, 3B and 4;

column 4, lines 2-57, column 10, lines 1-16, column 5, lines 1-63, and column 6, lines 22-44;

column 8, lines 10-38; column 10, lines 35-67; column 12, lines 1-67).

3.   Claim 9:

The claim 9 encompasses the same scope of invention as that of claim 1 in a method

form. The claim is rejected for the same reason as set forth in claim 1.

Claim 10:

The claim 10 encompasses the same scope of invention as that of claim 9 except

additional claimed limitation of converting a pixel data array for the at least one image frame

from a red-green-blue color space (RGB) data array to the HSV data array. However, Bradski

further discloses the claimed limitation of converting a pixel data array for the at least one image

frame from a red-green-blue color space (RGB) data array to the HSV data array (column 4,

lines 1-57).

Claim 11:

The claim 11 encompasses the same scope of invention as that of claim 28 except

additional claimed limitation of applying the pixel data from an entire frame to the pixel-

classification look-up map wherein if the amount of the pixels associated with the selected object

is greater than a predetermined amount, the calibration method restarts. However, Bradski

further discloses the claimed limitation of applying the pixel data from an entire frame to the

pixel-classification look-up map (column 4, lines 45-60) wherein if the amount of the pixels

associated with the selected object is greater than a predetermined amount, the calibration

method restarts (figures 3A, 3B and 4; column 4, lines 1-61; column 6, lines 5-57; column 10,

lines 35-67).

Claim 13:

The claim 13 encompasses the same scope of invention as that of claim 10 except

additional claimed limitation of thresholding the HSV data array of pixels and disregarding pixel

data for each of the pixels having a product of a saturation coordinate and a value coordinate

below a predetermined threshold amount. However, Bradski further discloses the claimed

limitation of thresholding the HSV data array of pixels and disregarding pixel data for each of

the pixels having a product of a saturation coordinate and a value coordinate below a

predetermined threshold amount (From the Bradski's teaching that "Hue values are only

accumulated if their corresponding S and V values are above respective S and V thresholds"..., it

can be seen that pixel data with the product of S and V values less than a threshold would be

excluded from accumulation to the Hue values. See figures 3A, 3B and 4; column 4, lines 1-57;

column 5, lines 1-61; column 10, lines 35-67; column 13, lines 55-67; column 14, lines 1-59).

Claim 14:

The claim 14 encompasses the same scope of invention as that of claim 10 except

additional claimed limitation of calculating a mean hue and a standard deviation of a hue of the

pixels in the selected object. However, Bradski further discloses the claimed limitation of calculating a mean hue and a standard deviation of a hue of the pixels (The mean hue and standard deviation of a hue values are inherently associated with hue probability density) in the selected object (column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 8, lines 10-38; column 10, lines 35-67; column 12, lines 1-67).

Claim 15:

The claim 15 encompasses the same scope of invention as that of claim 14 except additional claimed limitation of restarting the calibration method if the mean hue or the standard deviation of the hue is less than predetermined level. However, Bradski further discloses the claimed limitation of restarting the calibration method (restarting searching) if the mean hue or the standard deviation of the hue is less than predetermined level (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 1-44; column 8, lines 10-38; column 10, lines 35-67; column 12, lines 1-67).

Claim 16:

The claim 16 encompasses the same scope of invention as that of claim 10 except additional claimed limitation of calculating a mean saturation and a standard deviation of a saturation of the pixels in the selected object. However, Bradski further discloses the claimed limitation of calculating a mean saturation and a standard deviation of a saturation of the pixels in the selected object (figures 3A, 3B and 4; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 12, lines 1-67).

Claim 17:

The claim 17 encompasses the same scope of invention as that of claim 16 except additional claimed limitation of restarting the calibration method if one of the mean saturation and the standard deviation of the saturation is less than predetermined level. However, Bradski further discloses the claimed limitation of restarting the calibration method if one of the mean saturation and the standard deviation of the saturation is less than predetermined level (figures 3A and 3B; column 4, lines 2-57, column 10, lines 1-16, column 5, lines 31-63, and column 6, lines 22-44; column 12, lines 1-67).

Claim 18:

The claim 18 encompasses the same scope of invention as that of claim 10 except additional claimed limitation of allowing the user to select the selected object. However, Bradski further discloses the claimed limitation of allowing the user to select the selected object (column 4, lines 1-57; column 15, lines 1-67).

Claim 21:

The claim 21 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of a thresholding module to disregard pixel data for each of the pixels having a product of a saturation coordinate and a value coordinate below a predetermined threshold amount. However, Bradski further discloses the claimed limitation of a thresholding module to disregard pixel data for each of the pixels having a product of a saturation coordinate and a value coordinate below a predetermined threshold amount (figures 3A, 3B, 4-5; column 4, lines 1-57; column 13, lines 55-67; column 14, lines 1-59).

Claim 22:

The claim 22 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of the calibration rectangle being smaller than the at least one image frame. However, Bradski further discloses the claimed limitation of the calibration rectangle being smaller than the at least one image frame (figures 4, 10A-10B and 14A; column 6, lines 1-67; column 15, lines 1-67).

Claim 23:

The claim 23 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of each of the adjacent test windows having a same size as the calibration rectangle. However, Bradski further discloses the claimed limitation of each of the adjacent test windows having a same size as the calibration rectangle (figures 4, 10A-10B and 14A; column 6, lines 1-67; figures 11-14, column 15, lines 1-67).

Claim 24:

The claim 24 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of each of the adjacent test windows having at least one pixel overlapping with the calibration rectangle. However, Bradski further discloses the claimed limitation of each of the adjacent test windows having at least one pixel overlapping with the calibration rectangle (figures 4, 10A-10B and 14A; column 6, lines 1-67; figures 11-14, column 15, lines 1-67).

Claim 25:

The claim 25 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of the calibration rectangle being smaller than the at least one image frame. However, Bradski further discloses the claimed limitation of the calibration

rectangle being smaller than the at least one image frame (figures 4, 10A-10B, and 14A; column 6, lines 1-67; column 15, lines 1-67).

Claim 26:

The claim 26 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of each of the adjacent test windows having a same size as the calibration rectangle. However, Bradski further discloses the claimed limitation of each of the adjacent test windows having a same size as the calibration rectangle (figures 4, 10A, 10B and 14A; column 6, lines 1-67; figures 11-14, column 15, lines 1-67).

Claim 27:

The claim 27 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of each of the adjacent test windows having at least one pixel overlapping with the calibration rectangle. However, Bradski further discloses the claimed limitation of each of the adjacent test windows (the moving search windows) having at least one pixel overlapping with the calibration rectangle (figures 4, 10A-10B; column 6, lines 1-67; figures 11-14, column 15, lines 1-67).

Claim 28:

The claim 28 encompasses the same scope of invention as that of claim 9 except additional claimed limitation of creating a pixel-classification look-up map for the HSV data array of pixels, and the pixel classification map classifies the pixels belonging to the selected object based on a hue and a saturation of the pixels. However, Bradski further discloses the claimed limitation of creating a pixel-classification look-up map for the HSV data array of pixels, and the pixel classification map classifies the pixels belonging to the selected object

based on a hue and a saturation of the pixels (figures 4, 10A and 10B; column 4, lines 2-57;

column 6, lines 5-35).

Conclusion

4.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jin-Cheng Wang whose telephone number is (703) 605-1213.

The examiner can normally be reached on 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 308-6606 for regular

communications and (703) 308-6606 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 395-3900.

jcw
September 28, 2003

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600